We claim:

1. A method of deriving one of a plurality of output audio signals from two input audio signals $S1(\alpha)$ and $S2(\alpha)$, the output audio signal associated with a principal direction $\beta 2$, the input audio signals encoded with an audio source signal having a direction α, comprising

generating two antidominant audio signals of the form:

$\text{antidominant}\beta 1(\alpha) = AS1\beta 1 \cdot S1(\alpha) + AS2\beta 1 \cdot S2(\alpha)$

and

$\text{antidominant}\beta 3(\alpha) = AS1\beta 3 \cdot S1(\alpha) + AS2\beta 3 \cdot S2(\alpha)$,

wherein in one antidominant signal the angle $\beta 1$ is the angle of one of the two principal directions adjacent to the principal direction $\beta 2$ of the output audio signal and in the other antidominant signal the angle $\beta 3$ is the angle of the other of the two principal directions adjacent to the principal direction $\beta 2$ of the output audio signal, and wherein the coefficients $AS1\beta 1$ and $AS2\beta 1$ are selected so that the one antidominant signal is substantially zero when α is $\beta 1$ and the coefficients $AS1\beta 3$ and $AS2\beta 3$ are selected so that the other antidominant signal is substantially zero when α is $\beta 3$,

applying amplitude control to the two antidominant signals to deliver a pair of signals having substantially equal magnitudes, and

additively or subtractively combining the amplitude controlled antidominant audio signals to provide the output audio signal.

2. A method of deriving one of a plurality of output audio signals from two or more input audio signals ($S1(\alpha)$, ...$Sn(\alpha)$), the output audio signal associated with a principal direction $\beta 2$, the input audio signals encoded with an audio source signal having a direction α, comprising

generating two antidominant audio signals of the form:

$$anti\beta 1(\alpha) = \sum_{n=1}^{N} ASn\beta 1 \cdot Sn(\alpha)$$

and

$$anti\beta 3(\alpha) = \sum_{n=1}^{N} ASn\beta 3 \cdot Sn(\alpha)$$

wherein N is the number of input audio signals, β1 is the angle of one of the two principal directions adjacent to the principal direction β2 of the output audio signal, β3 is the angle of the other of the two principal directions adjacent to the principal direction β2 of the output audio signal, and the coefficients ASnβ1 and ASnβ3 are selected so that the antidominant signals have one relative polarity when α lies between β1 and β3 and the other relative polarity for all other values of α,

controlling the relative amplitudes of the two antidominant audio signals so that their amplitudes are urged toward equality, and

additively or subtractively combining the amplitude controlled antidominant audio signals to provide the output audio signal.

3. A method of deriving one of a plurality of output audio signals from two input audio signals S1(α) and S2(α), the output audio signal associated with a principal direction β2, the input audio signals encoded with an audio source signal having a direction α, comprising

generating two antidominant audio signals of the form:

antidominantβ1(α) = AS1β1·S1(α) + AS2β1·S2(α)

and

antidominantβ3(α) = AS1β3·S1(α) + AS2β3·S2(α),

wherein in one antidominant signal the angle β1 is the angle of one of the two principal directions adjacent to the principal direction β2 of the output audio signal and in the other

antidominant signal the angle β3 is the angle of the other of the two principal directions adjacent to the principal direction β2 of the output audio signal, and wherein the coefficients AS1β1 and AS2β1 are selected so that the one antidominant signal is substantially zero when α is β1 and the coefficients AS1β3 and AS2β3 are selected so that the other antidominant signal is substantially zero when α is β3,

applying amplitude control to the two antidominant signals to deliver a first pair of signals having substantially equal magnitudes, the pair of signals having the form

antidominantβ(α)·(1-g),

where g is the gain or attenuation of an amplitude control element or function, and a second pair of signals having the form

antidominantβ(α)·g,

generating the passive matrix component for the principal direction β2, and

additively or subtractively combining the second pair of signals with the passive matrix component for the principal output direction β2 to provide the output audio signal.

4. A method of deriving one of a plurality of output audio signals from two or more input audio signals (S1(α), ...Sn(α)), the output audio signal associated with a principal direction β2, the input audio signals encoded with an audio source signal having a direction α, comprising

generating two antidominant audio signals of the form:

$$anti\beta 1(\alpha) = \sum_{n=1}^{N} ASn\beta 1 \cdot Sn(\alpha)$$

and

$$anti\beta 3(\alpha) = \sum_{n=1}^{N} ASn\beta 3 \cdot Sn(\alpha)$$

wherein N is the number of input audio signals, β1 is the angle of one of the two principal directions adjacent to the principal direction β2 of the output audio signal, β3 is the angle of the

other of the two principal directions adjacent to the principal direction β2 of the output audio signal, and the coefficients ASnβ1 and ASnβ3 are selected so that the antidominant signals have one relative polarity when α lies between β1 and β3 and the other relative polarity for all other values of α,

applying amplitude control to the two antidominant signals to deliver a first pair of signals having substantially equal magnitudes, the pair of signals having the form

$$\text{antidominant}\beta(\alpha)\cdot(1\text{-}g),$$

where g is the gain or attenuation of an amplitude control element or function, and a second pair of signals having the form

$$\text{antidominant}\beta(\alpha)\cdot g,$$

generating the passive matrix component for the principal direction β2, and

additively or subtractively combining the second pair of signals with the passive matrix component for the principal output direction β2 to provide the output audio signal.

5. A method according to any one of claims 1 through 4 further comprising

scaling the relative amplitude of the first antidominant signal with respect to the second antidominant signal by a substantially fixed constant.

6. A method according to any one of claims 1 through 4 further comprising

variably scaling the first and second antidominant signals with respect to the direction α of an audio source signal encoded into the input audio signals.

7. A method according to claim 1 or claim 2 wherein the sense in which the amplitude controlled antidominant signals are combined is the polarity that places the output signal direction within the smaller of the two arcs between the adjacent principal directions β1 and β2.

8. A method according to claim 3 or claim 4 wherein the sense in which the second pair of signals is combined with the passive matrix component is the polarity that places the output signal direction within the smaller of the two arcs between the adjacent principal directions $\beta 1$ and $\beta 2$.

9. Apparatus for deriving one of a plurality of output audio signals from two input audio signals $S1(\alpha)$ and $S2(\alpha)$, the output audio signal associated with a principal direction $\beta 2$, the input audio signals encoded with an audio source signal having a direction α, comprising

an antidominant matrix receiving said two input audio signals, the matrix generating two antidominant audio signals of the form:

$$\text{antidominant}\beta 1(\alpha) = AS1\beta 1 \cdot S1(\alpha) + AS2\beta 1 \cdot S2(\alpha)$$

and

$$\text{antidominant}\beta 3(\alpha) = AS1\beta 3 \cdot S1(\alpha) + AS2\beta 3 \cdot S2(\alpha),$$

wherein in one antidominant signal the angle $\beta 1$ is the angle of one of the two principal directions adjacent to the principal direction $\beta 2$ of the output audio signal and in the other antidominant signal the angle $\beta 3$ is the angle of the other of the two principal directions adjacent to the principal direction $\beta 2$ of the output audio signal, and wherein the coefficients $AS1\beta 1$ and $AS2\beta 1$ are selected so that the one antidominant signal is substantially zero when α is $\beta 1$ and the coefficients $AS1\beta 3$ and $AS2\beta 3$ are selected so that the other antidominant signal is substantially zero when α is $\beta 3$,

a servo including a pair of variable amplifiers or attenuators receiving the two antidominant signals and delivering a pair of signals having substantially equal magnitudes, and

a combiner combining additively or subtractively the amplitude controlled antidominant audio signals to provide the output audio signal.

10. Apparatus for deriving one of a plurality of output audio signals from two or more input audio signals (S1(α), ...Sn(α)), the output audio signal associated with a principal direction β2, the input audio signals encoded with an audio source signal having a direction α, comprising

an antidominant matrix receiving said two input signals, the matrix generating two antidominant audio signals of the form:

$$anti\beta 1(\alpha) = \sum_{n=1}^{N} ASn\beta 1 \cdot Sn(\alpha)$$

and

$$anti\beta 3(\alpha) = \sum_{n=1}^{N} ASn\beta 3 \cdot Sn(\alpha)$$

wherein N is the number of input audio signals, β1 is the angle of one of the two principal directions adjacent to the principal direction β2 of the output audio signal, β3 is the angle of the other of the two principal directions adjacent to the principal direction β2 of the output audio signal, and the coefficients ASnβ1 and ASnβ3 are selected so that the antidominant signals have one relative polarity when α lies between β1 and β3 and the other relative polarity for all other values of α,

a servo including a pair of variable amplifiers or attenuators receiving the two antidominant signals and delivering a pair of signals having substantially equal magnitudes, and

a combiner combining additively or subtractively the amplitude controlled antidominant audio signals to provide the output audio signal.

11. Apparatus for deriving one of a plurality of output audio signals from two input audio signals S1(α) and S2(α), the output audio signal associated with a principal direction β2, the input audio signals encoded with an audio source signal having a direction α, comprising

an antidominant matrix receiving said two input signals, the matrix generating two

antidominant audio signals of the form:

$$\text{antidominant}\beta1(\alpha) = AS1\beta1 \cdot S1(\alpha) + AS2\beta1 \cdot S2(\alpha)$$

and

$$\text{antidominant}\beta3(\alpha) = AS1\beta3 \cdot S1(\alpha) + AS2\beta3 \cdot S2(\alpha),$$

wherein in one antidominant signal the angle β1 is the angle of one of the two principal directions adjacent to the principal direction β2 of the output audio signal and in the other antidominant signal the angle β3 is the angle of the other of the two principal directions adjacent to the principal direction β2 of the output audio signal, and wherein the coefficients AS1β1 and AS2β1 are selected so that the one antidominant signal is substantially zero when α is β1 and the coefficients AS1β3 and AS2β3 are selected so that the other antidominant signal is substantially zero when α is β3,

a servo including a pair of variable amplifiers or attenuators receiving the two antidominant signals and delivering a first pair of signals having substantially equal magnitudes having the form

$$\text{antidominant}\beta(\alpha)\cdot(1\text{-}g),$$

where g is the gain or attenuation of an amplitude control element or function, and a second pair of signals having the form

$$\text{antidominant}\beta(\alpha)\cdot g,$$

and,

a passive matrix receiving said two input audio signals, the matrix generating the passive matrix component for the principal direction β2, and

a combiner combining additively or subtractively the second pair of signals with the passive matrix component for the principal output direction β2 to provide the output audio signal.

12. Apparatus for deriving one of a plurality of output audio signals from two or more input audio signals ($S1(\alpha)$, ...$Sn(\alpha)$), the output audio signal associated with a principal direction $\beta 2$, the input audio signals encoded with an audio source signal having a direction α, comprising

an antidominant matrix receiving said two input signals, the matrix generating two antidominant audio signals of the form:

$$anti\beta 1(\alpha) = \sum_{n=1}^{N} ASn\beta 1 \cdot Sn(\alpha)$$

and

$$anti\beta 3(\alpha) = \sum_{n=1}^{N} ASn\beta 3 \cdot Sn(\alpha)$$

wherein N is the number of input audio signals, $\beta 1$ is the angle of one of the two principal directions adjacent to the principal direction $\beta 2$ of the output audio signal, $\beta 3$ is the angle of the other of the two principal directions adjacent to the principal direction $\beta 2$ of the output audio signal, and the coefficients $ASn\beta 1$ and $ASn\beta 3$ are selected so that the antidominant signals have one relative polarity when α lies between $\beta 1$ and $\beta 3$ and the other relative polarity for all other values of α,

a servo including a pair of variable amplifiers or attenuators receiving the two antidominant signals and delivering a first pair of signals having substantially equal magnitudes having the form

$$antidominant\beta(\alpha) \cdot (1-g),$$

where g is the gain or attenuation of an amplitude control element or function, and a second pair of signals having the form

$$antidominant\beta(\alpha) \cdot g,$$

and,

a passive matrix receiving said two input audio signals, the matrix generating the passive matrix component for the principal direction $\beta 2$, and

a combiner combining additively or subtractively the second pair of signals with the passive matrix component for the principal output direction $\beta 2$ to provide the output audio signal.

13. Apparatus according to any one of claims 9 through 12 further comprising

an amplifier or attenuator receiving the first and/or second antidominant signal for scaling the relative amplitude of the first antidominant signal with respect to the second antidominant signal by a substantially fixed constant.

14. Apparatus according to any one of claims 9 through 12 further comprising

a variable amplifier or attenuator receiving the first and second antidominant signals for scaling the first and second antidominant signals with respect to the direction α of an audio source signal encoded into the input audio signals.

15. Apparatus according to claim 9 or claim 10 wherein said combiner combines the amplitude controlled antidominant signals in the polarity that places the output signal direction within the smaller of the two arcs between the adjacent principal directions $\beta 1$ and $\beta 2$.

16. Apparatus according to claim 11 or claim 12 wherein said combiner combines the second pair of signals with the passive matrix component in the polarity that places the output signal direction within the smaller of the two arcs between the adjacent principal directions $\beta 1$ and $\beta 2$.